AMENDMENTS TO THE CLAIMS:

The following listing of claims supersedes all prior versions and listings of claims in this application:

LISTING OF CLAIMS:

1. (Withdrawn) An MRI apparatus configured to obtain an ASL (Arterial Spin Labeling) image of a region to be imaged in a subject by performing a scan to said region to be imaged independently in a control mode and in a tag mode according to a pulse sequence based on an ASL technique, wherein:

said pulse sequence is set with a velocity-selective pulse that selectively excites magnetization spins in a fluid passing through said region to be imaged and having a constant velocity range for the spins to undergo transition to transverse magnetization, and then performs excitation to cause the transverse magnetization to flip back to longitudinal magnetization; and

said velocity-selective pulse is formed in such a manner that the longitudinal magnetization excited in each of said control mode and said tag mode is reversed in polarity upon velocity-selective excitation by said velocity-selective pulse.

2. Cancelled

3. (Withdrawn) The MRI apparatus according to Claim 1, wherein:

said velocity-selective pulse includes a first flip pulse applied first on a time axis, an inversion pulse applied after said first flip pulse, a second flip pulse applied after said inversion pulse, and a velocity encode pulse applied in a period after said first flip pulse is applied and before said inversion pulse is applied and in a period after said inversion pulse is applied and before said second flip pulse is applied.

4. Cancelled

5. (Withdrawn) The MRI apparatus according to Claim 3, wherein:

said velocity-selective pulse further includes a gradient magnetic field pulse that is applied together with said first and second flip pulses as well as said inversion pulse, and spatially selects a region including said region to be imaged.

6-8. Cancelled

9. (Currently Amended) An MRI apparatus configured to obtain an ASL (Arterial Spin Labeling) image of [[a]] an image region to be imaged in a subject by performing [[a]] scans ~~to said region to be imaged~~ independently in (a) a control mode, and [[in]] (b)

a tag mode according to [[a]] an MRI pulse sequence based on an ASL technique, wherein:

said pulse sequence includes (a) a slice-selective pulse that spatially selects [[a]] an upstream region outside said image region ~~to be imaged~~ and excites transverse magnetization spins within said upstream region ~~for the spins to undergo transition to transverse magnetization~~, and (b) a velocity-selective pulse train that selectively excites transverse magnetization spins ~~in a fluid passing through said region to be imaged and~~ having a constant velocity range in a region including said image region ~~for the spins to undergo transition to transverse magnetization~~, and then performs excitation to cause the transverse magnetization spins to flip back to longitudinal magnetization,

said velocity-selective pulse train including a first flip pulse, an inversion pulse after said first flip pulse, a second flip pulse after said inversion pulse, a velocity encode pulse (a) after said first flip pulse and before said inversion pulse, and (b) after said inversion pulse and before said second flip pulse, and a gradient magnetic field pulse that is applied together with said first and second flip pulses as well as said inversion pulse to spatially select a region including said image region.

10. Cancelled

11. (Currently Amended) The MRI apparatus according to Claim [[10]] 9, wherein:

said ~~slice-selective pulse is formed to select a predetermined~~ upstream region [[that]] resides on an upstream side of [[the]] a fluid flowing into said image region ~~to be imaged~~ and is adjacent to the region ~~including said region to be imaged,~~ which is selected by said velocity-selective pulse train, without any gap [[in]] between said regions.

12. (Currently Amended) The MRI apparatus according to Claim 11, wherein:

~~strength of~~ said velocity encode pulse and a flip phase of said second flip pulse [[are]] have magnitudes set in such a manner that the longitudinal magnetization of the magnetization spins in the fluid excited via said slice-selective pulse and said velocity-selective pulse train is of a same polarity in both of said control mode and said tag mode.

13. (Currently Amended) An MRI apparatus configured to obtain an ASL (Arterial Spin Labeling) image of [[a]] an image region ~~to be imaged~~ in a subject by performing [[a]] scans ~~to said region to be imaged~~ independently in (a) a control mode, and (b) [[in]] a tag mode according to [[a]] an MRI pulse sequence based on an ASL technique, wherein:

said pulse sequence includes a pulse train that (a) spatially selects [[a]] an upstream region outside said image region to be imaged and ~~excites~~ provides transverse magnetization spins within said upstream region ~~for the spins to undergo transition to transverse magnetization~~, and (b) selectively excites [[the]] transverse magnetization spins ~~in a fluid passing through said region to be imaged and~~ having a constant velocity range [[for]] in a region including said image region causing the spins to undergo transition to transverse magnetization, and then performs excitation to cause the transverse magnetization spins to flip back to longitudinal magnetization spins,

said pulse train applying (i) a first flip pulse, (ii) an inversion pulse after said first flip pulse, (iii) a second flip pulse after said inversion pulse, (iv) a velocity encode pulse (a) in a period after said first flip pulse and before said inversion pulse, and (b) in a period after said inversion pulse and before said second flip pulse, and (v) a gradient magnetic field pulse together with said first and second flip pulses as well as said inversion pulse to spatially select a region including said image region.

14. (Withdrawn) An MRI apparatus configured to obtain an ASL (Arterial Spin Labeling) image of a region to be imaged in a subject by performing a scan to said region to be imaged independently in a control mode and in a tag mode according to a pulse sequence based on an ASL technique, wherein:

said pulse sequence includes a velocity-selective pulse that selectively excites magnetization spins in a fluid passing through said region to be imaged and having a constant velocity region for the spins to undergo transition to transverse magnetization, and then performs excitation to cause the transverse magnetization to flip back to longitudinal magnetization; and

said velocity-selective pulse includes a pulse train that spatially selects a region including said region to be imaged.

15-18. Cancelled

19. (Currently Amended) An ASL (Arterial Spin Labeling) imaging technique for obtaining an ASL image of [[a]] an image region to be imaged in a subject by performing [[a]] scans ~~to said region to be imaged~~ independently in (a) a control mode, and (b) [[in]] a tag mode according to [[a]] an MRI pulse sequence based on an ASL technique, wherein:

[[as]] said pulse sequence[[,]] includes (a) applying a slice-selective pulse that spatially selects a region outside said image region ~~to be imaged~~ and excites magnetization spins within said image region for the spins to undergo transition to transverse magnetization ~~is applied, after which~~ and thereafter (b) applying a velocity-

selective pulse train that selectively excites magnetization spins ~~in a fluid passing through said region to be imaged and~~ having a constant velocity range in a region including said image region for the spins to undergo transition to transverse magnetization, and then ~~performs~~ applying excitation to cause the transverse magnetization to flip back to longitudinal magnetization ~~is applied~~, followed by (c) applying an imaging pulse train,

said velocity-selective pulse train including (a) a first flip pulse, (b) an inversion pulse after said first flip pulse, (c) a second flip pulse after said inversion pulse, (d) a velocity encode pulse (i) in a period after said first flip pulse and before said inversion pulse, and (ii) in a period after said inversion pulse and before said second flip pulse, and (e) a gradient magnetic field pulse applied together with said first and second flip pulses as well as said inversion pulse to spatially select a region including said image region.

20. Cancelled

21. (New) An MRI method for obtaining an ASL (Arterial Spin Labeling) image of an image region to be imaged in a subject by performing scans independently in (a) a control mode, and (b) a tag mode according to an MRI pulse sequence based on an ASL technique, said method comprising:

generating an ASL MRI pulse sequence which includes (a) a slice-selective pulse that spatially selects an upstream region outside said image region and excites transverse magnetization spins within said upstream region, and (b) a velocity-selective pulse train that selectively excites transverse magnetization spins having a constant velocity range in a region including said image region, and then performs excitation to cause the transverse magnetization spins to flip back to longitudinal magnetization,

said velocity-selective pulse train including (a) a first flip pulse, (b) an inversion pulse after said first flip pulse, (c) a second flip pulse after said inversion pulse, (d) a velocity encode pulse (i) after said first flip pulse and before said inversion pulse, and (ii) after said inversion pulse and before said second flip pulse, and (e) a gradient magnetic field pulse applied together with said first and second flip pulses as well as said inversion pulse to spatially select a region including said image region.

22. (New) The MRI method according to Claim 21, wherein:

said upstream region resides on an upstream side of a fluid flowing into said image region and is adjacent to the image region which is selected by said velocity-selective pulse train, without any gap between said regions.

23. (New) The MRI method according to Claim 22, wherein:

said velocity encode pulse and a flip phase of said second flip pulse have magnitudes set in such a manner that the longitudinal magnetization of the magnetization spins in the fluid excited via said slice-selective pulse and said velocity-selective pulse train is of a same polarity in both of said control mode and said tag mode.

24. (New) An MRI method for obtaining an ASL (Arterial Spin Labeling) image of an image region in a subject by performing scans independently in (a) a control mode, and (b) a tag mode according to an MRI pulse sequence based on an ASL technique, said method comprising:

generating an ASL MRI pulse sequence which includes a pulse train that (a) spatially selects an upstream region outside said image region to be imaged and provides transverse magnetization spins within said upstream region, and (b) selectively excites transverse magnetization spins having a constant velocity range in a region including said mage region causing the spins to undergo transition to transverse magnetization, and then performs excitation to cause the transverse magnetization spins to flip back to longitudinal magnetization spins,

said pulse train applying (i) a first flip pulse, (ii) an inversion pulse after said first flip pulse, (iii) a second flip pulse after said inversion pulse, (iv) a velocity encode pulse

(a) in a period after said first flip pulse and before said inversion pulse, and (b) in a period after said inversion pulse and before said second flip pulse, and (v) a gradient magnetic field pulse together with said first and second flip pulses as well as said inversion pulse to spatially select a region including said image region.

25. (New) An ASL (Arterial Spin Labeling) imaging method for obtaining an ASL image of an image region to be imaged in a subject by performing scans independently in (a) a control mode, and (b) a tag mode according to an MRI pulse sequence based on an ASL technique, said method comprising:

applying to said subject an ASL MRI pulse sequence which includes (a) a slice-selective pulse that spatially selects a region outside said image region and excites magnetization spins within said image region for the spins to undergo transition to transverse magnetization and thereafter (b) a velocity-selective pulse train that selectively excites magnetization spins having a constant velocity range for the spins to undergo transition to transverse magnetization, and then an excitation to cause the transverse magnetization to flip back to longitudinal magnetization, followed by (c) an imaging pulse train,

said velocity-selective pulse train including (a) a first flip pulse, (b) an inversion pulse after said first flip pulse, (c) a second flip pulse after said inversion pulse, (d) a

velocity encode pulse (i) in a period after said first flip pulse and before said inversion pulse, and (ii) in a period after said inversion pulse and before said second flip pulse, and (e) a gradient magnetic field pulse applied together with said first and second flip pulses as well as said inversion pulse to spatially select a region including said image region.

26. (New) A method of arterial spin labeling (ASL) for magnetic resonance imaging (MRI), said method comprising:

(a) generating spatially-selective MR nutation of nuclei in a first region containing blood flow upstream of an image region thereby labeling flowing nuclei within the spatially-selected first region;

(b) generating spatially-selective band-limited velocity-selective nutation of nuclei in a second region which includes said image region thereby also labeling flowing nuclei within the spatially-selection second region; and

(c) thereafter performing an MRI sequence to acquire MRI data which includes data from nuclei labeled in both steps (a) and (b).

27. (New) Apparatus for arterial spin labeling (ASL) in magnetic resonance imaging (MRI), said apparatus comprising:

(a) means for generating spatially-selective MR nutation of nuclei in a first region containing blood flow upstream of an image region thereby labeling flowing nuclei within the spatially-selective first region;

(b) means for generating spatially-selective band-limited velocity-selective nutation of nuclei in a second region which includes said image region thereby also labeling flow nuclei within the spatially-selected second region; and

(c) means for thereafter performing an MRI sequence to acquire MRI data which includes data from nuclei labeled by both means (a) and means (b).

28. (New) A computer-readable medium containing computer program code which, when executed by a computer in a magnetic resonance imaging system controller, carries out the method of claim 26.